# Commentary

# Sherlock Holmes's Methods of Deductive Reasoning Applied to Medical Diagnostics

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***Having patterned the character of Sherlock Holmes after one of his professors, Sir Arthur Conan Doyle, himself a physician, incorporated many of the didactic qualities of the 19th century medical diagnostician into the character of Holmes. In this paper I explore Holmes's techniques of deductive reasoning and their basis in 19th and 20th century medical diagnostics.***

(Miller L: Sherlock Holmes's methods of deductive reasoning applied to medical diagnostics [Commentary]. West J Med 1985 Mar;142:413-414)

When I started reading the Sherlock Holmes stories, I was immediately struck by the similarities between what Holmes called deductive reasoning and what I was trying to do while making medical diagnoses. This casual observation was no mere coincidence. Sir Arthur Conan Doyle, himself a physician, patterned the fictional character of Holmes after one of his professors, Dr Joseph Bell, an expert in medical diagnostics. Doyle used basic theories of medical diagnostics to create his character's uncanny ability to reason in a deductive manner.

Sherlock Holmes epitomizes the logical thinker and teaches us more about deductive reasoning than any other character, literary or real. As physicians, if we read between the lines of Doyle's famous stories, we can learn a good deal about the art of medical diagnostics.

Fitzgerald and Tierney's article, "The Bedside Sherlock Holmes,"[1] was fascinating, but they did not fully explore the similarities between the methods of a criminal sleuth and a medical sleuth.

Medical diagnostics, deductive reasoning or good sleuthing can be divided into four basic processes: gathering facts, sorting facts, formulating differential diagnoses and arriving at solutions.

## Gathering the Facts

*The world is full of obvious things which nobody by any chance ever observes.*

THE HOUND OF THE BASKERVILLES, II:669-761*

Observation is the key to gathering the facts, and the facts are what we build logical inference and theory upon.

To gather the facts, we must first know what we are looking for. This depends on the type of investigation we undertake, but, no matter what kind of investigation, there are only two ways to obtain data. The first is by verbally interviewing people (taking the history). The second is by carefully scrutinizing objects (the physical examination). The practice of medicine usually depends heavily on the history.[2]

The facts must be gathered in great depth and breadth. Every detail must be scrutinized and described as accurately as possible. Facts must be described in this manner, first, because they may be transient. An observed fact will remain documented even if events change; an unobserved fact may be substantially altered when the observer next encounters it. Examples of transient facts include footprints in the mud, a transient seizure or a person's memory of seemingly inconsequential events.

Gathered facts can be sorted later and the wheat separated from the chaff. Ungathered facts will not profit the observer and will eventually be lost. To quote Holmes, "They say that genius is an infinite capacity for taking pains. It is a very bad definition, but it does apply to detective work" (*A Study in Scarlet*, I:15-46).

Second, just as the presence of certain facts may lead to certain conclusions, the absence of certain facts may be significant and lead to other conclusions. If facts are absent, let them be absent because they did not exist, not because we neglected to collect them.

As the facts are gathered, they will ultimately lead the investigation in certain directions. This, of course, is necessary, but there is a pitfall. Value judgments must be withheld until all the facts have been gathered and sorted, for faulty conclusions are drawn from insufficient data. In one of Holmes's more modest moments he admits, "I had come to an entirely erroneous conclusion, which shows, my dear Watson, how dangerous it always is to reason from insufficient data" (*The Speckled Band*, I:257-273). One would not call painless jaundice cholelithiasis without excluding by ap-

*All of the Sherlock Holmes references in this article are from A.C. Doyle, *The Complete Sherlock Holmes*, Volumes I and II, published by Doubleday and Company, Inc, 1930. Only the volume and chapter page numbers will be given.

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Reprints are not available.

propriate diagnostic techniques the possibility of biliary obstruction due to pancreatic cancer. I can state this no more eloquently than did Holmes: "It is a capital mistake to theorize before you have all the evidence" *(A Study in Scarlet).*

## Sorting the Facts

*I can never bring you to realize the importance of sleeves, the suggestiveness of thumb-nails, or the great issues that may hang from a bootlace.*

A CASE OF IDENTITY, I

The next process in deductive analysis is to sort the facts—to eliminate facts unnecessary to the investigation and to list positive findings and pertinent negative findings.

How does one go about sorting trivial from meaningful facts? The answer is experience in the field in which one is working. Sherlock Holmes was an expert in his field. "As a rule, when I have heard some slight indications of the course of events I am able to guide myself by the thousands of other similar cases which occur to my memory" (*Red-Headed League,* I:176-190).

As explained by DeGowin and DeGowin,

As new facts are acquired by any means, the physician repeatedly tests them for reliability. He must conclude whether the items are trivial or relevant to the identification of the patient's disease. From the accumulated facts he must select for further consideration those symptoms and signs that his experience has taught are most likely to be helpful clues.[3]

## Differential Diagnosis

*It is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts.*

A SCANDAL IN BOHEMIA, I:161-176

Now that one has all the positive findings listed, one may go on to formulate explanations to fit the facts.

From where do these explanations come? The explanations that are formulated come from a store of information that the investigator has accumulated (a file of information). The file may be a physical file, a library of information or a reservoir of memories.

We can train ourselves to observe and through experience we can learn to sort facts, but accumulating a file (the knowledge or store of information) on which to base one's theories is a lifetime pursuit.

Sherlock Holmes, speaking of the French detective Francois le Villaid, says,

He has considerable gifts himself. He possesses two out of the three qualities necessary for the ideal detective. He has the power of observation and that of deduction. He is only wanting in knowledge; and that may come in time (*The Sign of the Four,* I:89-143).

## Arriving at a Diagnosis

*It is an old maxim of mine that when you have excluded the impossible, whatever remains, however improbable, must be the truth.*

THE BERYL CORONET, I:301-316

The hard work is done and the pieces of the puzzle should now fall into place. We have a list of positive findings and a list of possible explanations. All we need do is fit the explanation to the findings. If we have a fact that contradicts one of our presumptive explanations, then our explanation is faulty and must be eliminated. When we are left with one explanation that fits all of our facts, then we have reached our final solution.

We must always take care to dismiss explanations that contradict facts and not discard facts that contradict explanations. As Holmes explains, "I can discover facts, Watson, but I cannot change them" (*Thor Bridge,* II:1054-1070). We must also beware not to violate the law of parsimony by accounting for a set of facts with numerous explanations. To explain a whole set of facts with one explanation is the trick.

## Conclusion

If approached in a random manner, medical diagnosis is a chore; if approached in a systematic, logical manner, medical diagnosis is an intellectual exercise, much like detective work.

Once we know how to look at and solve problems in an organized manner, we are forever drawn into the art of deductive reasoning. To quote Holmes one last time, "The faculty of deduction is certainly contagious, Watson" *(Thor Bridge).*

### REFERENCES

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